

REMARKS**1. Introduction**

In the Office action specified claims were rejected as being unsuitable for patent protection in view of, *inter alia*, Hunt-Grubbe pursuant to either 35 USC section 102(b) or 35 USC section 103(a). Applicants point out that a principle distinction between the current invention as presently claimed and the apparatus of Hunt-Grubbe concerns the mode of operation. With respect to the instant invention, paragraph [Para 19] describes the tool as being configured to facilitate logging of the diameter of a borehole as the tool traverses the borehole. To that end, the invention is configured so that the cam may rotate in response to movement of the follower arm due to expansion and contraction of the bow spring as the tool traverses the borehole. See paragraphs [Para 20] and [Para 24]. Considering that the displacement of the cam from the proximity sensor is monitored to determine the borehole diameters, see paragraph [Para 21], Applicants found it necessary to achieve cam displacement accuracy. See paragraph [Para 26]. To that end, Applicants pivotally coupled a cam to a pad present on the bow spring employing a pin-in-slot joint, see paragraph [Para 21], to control mechanical slop in the system. See paragraph [Para 26]. The pin-in-slot joint facilitates centering the pad with respect to the bow spring by allowing translation and rotational motion therebetween as the bow spring flexes.

With respect to Hunt-Grubbe it is assumed, *arguendo*, that nose 40 is analogous to the claimed cam, rounded tip 38 is analogous to the claimed pad, and rigid caliper arm 32 is analogous to the claimed follower arm. It is realized then that the Hunt-Grubbe apparatus operates according to a cantilever action due to the nose 40 and rounded tip 38 being disposed at opposite ends of rigid caliper arm 32. As a result, Hunt-Grubbe states that the position of the nose 40 determined by proximity sensor 70 unambiguously defines the position of the rounded tip 38. See col. 4, lines 10-17. This is due to the relative position between nose 40 and rounded tip 38 being fixed, i.e., the arm upon which both elements are formed is rigid. See col. 3, lines 26-29. With these principles in mind Applicants point out the claimed distinctions that facilitate operation of the claimed invention.

2. Rejection of the Claims

In the Office Action claims 1, 11 and 21 were rejected pursuant to 35 USC section 102(b) as being anticipated by Hunt-Grubbe. Inchoate in any anticipation rejection is an obviousness rejection pursuant to 35 USC section 103(a). As a result, Applicants address any inchoate obvious rejection along with the anticipation rejections.

a. Amended Claim 1

Amended claim 1 defines a borehole caliper tool that includes, in pertinent part, a follower arm coupled to a tool body, with the follower arm including a cam, having mass, coupled to reciprocate about a joint and facilitate a displacement of the mass away from the proximity sensor in response to rotation of the follower arm outwardly away from the tool body, with the proximity sensor being positioned to sense displacement of the mass and generate an output containing information of the deflection of the follower arm relative to the tool body.

Hunt-Grubbe does not teach displacing a mass away from a proximity sensor in response to rotation of the follower arm outwardly from the tool body. Rather, Hunt-Grubbe teaches moving the nose 40 close to the proximity sensor 70 as the rigid caliper arm 32 moves away from the tool body. See Fig. 3 and accompanying text. This results from the cantilever movement of the rigid caliper arm 32 and contact finger 38 and nose 40 being disposed at opposite ends thereof. Moreover, there is no disclosure or suggestion to modify Hunt-Grubbe to include Applicants' claimed features, because Hunt-Grubbe teaches away from having a bow spring mechanism as taught by Applicants. See col. 4, lines 23-25.

Moreover, none of the remaining cited art overcomes the deficiencies of Hunt-Grubbe. Therefore, Applicants respectfully contend that claim 1, as amended is neither anticipated nor rendered obvious by the cited art.

b. Amended Claim 11

Amended claim 11 defines a borehole caliper tool having, in pertinent part, a pad for engagement with a surface of the borehole and a cam pivotally coupled to the pad, the cam having mass and being coupled to reciprocate about the pivot joint to facilitate a

displacement of the mass with respect to a proximity sensor in response to contact of the pad with the surface. Hunt-Grubbe does not teach pivotally coupling the pad to the cam. Rather, Hunt-Grubbe teaches that is it desired to have the nose 40 in a fixed spatial relationship with respect to the rounded tip 38. See col. 3, lines 26-37; col. 4, lines 9-13. Specifically, the caliper arm is defined as being rigid and the nose portion is described as serving as a reference point to unambiguously define the position of rounded tip 38. Thus, Hunt-Grubbe teaches away from the claimed caliper tool in which the pad is pivotally coupled to the cam, thereby allowing the relative positions between the two to vary.

Moreover, none of the remaining cited references overcome the deficiencies of Hunt-Grubbe. Therefore, Applicants respectfully contend that amended claim 11 is neither anticipated nor obvious in view of the cited art.

c. Amended Claim 21

Amended claim 21 defines a method for gauging a diameter of a borehole having a longitudinal axis extending transversely to the diameter, the method includes, in pertinent part, moving a tool body having a proximity sensor and an arm assembly along the longitudinal axis. The follower arm has a cam including mass. Displacement of the mass is monitored to determine the magnitude of the bore diameter based upon a magnitude of the displacement. The magnitude of the displacement is inversely related to the bore diameter.

As discussed above with respect to amended claim 1, the mass of the cam is displaced away from the proximity sensor in response to rotation of the follower arm outwardly away from the tool body. This results from the use of the bow spring having the pad proximately centered thereupon. As a result, as the bore diameter becomes smaller, the angle of the follower arm becomes greater resulting in greater displacement of the cam from the proximity sensor. Conversely, as the borehole diameter becomes larger, displacement of the mass from the proximity sensor becomes larger. Thus, the displacement of the mass from the proximity sensor is inversely related to the borehole diameter.

Hunt-Grubbe does not teach displacing a mass away from a proximity sensor in response to rotation of the follower arm outwardly from the tool body. Rather, Hunt-Grubbe teaches moving the nose 40 close to the proximity sensor 70 as the rigid caliper arm 32 moves away from the tool body. See Fig. 3 and accompanying text. This results from the cantilever movement of the rigid caliper arm 32 and contact finger 38 and nose 40 being disposed at opposite ends thereof. Moreover, there is no disclosure or suggestion to modify Hunt-Grubbe to include Applicants' claimed features, because Hunt-Grubbe teaches away from having a bow spring mechanism as taught by Applicants. See col. 4, lines 23-25.

Moreover, none of the remaining cited art overcomes the deficiencies of Hunt-Grubbe. Therefore, Applicants respectfully contend that claim 21, as amended is neither anticipated nor rendered obvious by the cited art.

3. The Non-obviousness of the Dependent Claims

Considering that the dependent claims include all of the features of the independent claims from which they depend, these claims are patentable to the extent that the independent claims are patentable. Therefore, Applicants respectfully contend that the dependent claims are in condition for grant.

Claim 15 has been canceled without prejudice. Applicants submit that amended claims 1 – 14 and 16 – 21 are in condition for allowance and passage to issuance is respectfully requested. If the Examiner believes that a telephone conference would be advantageous in advancing the issuance of this application, a call to the undersigned at (281) 285-4562 is encouraged.

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Respectfully submitted,



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